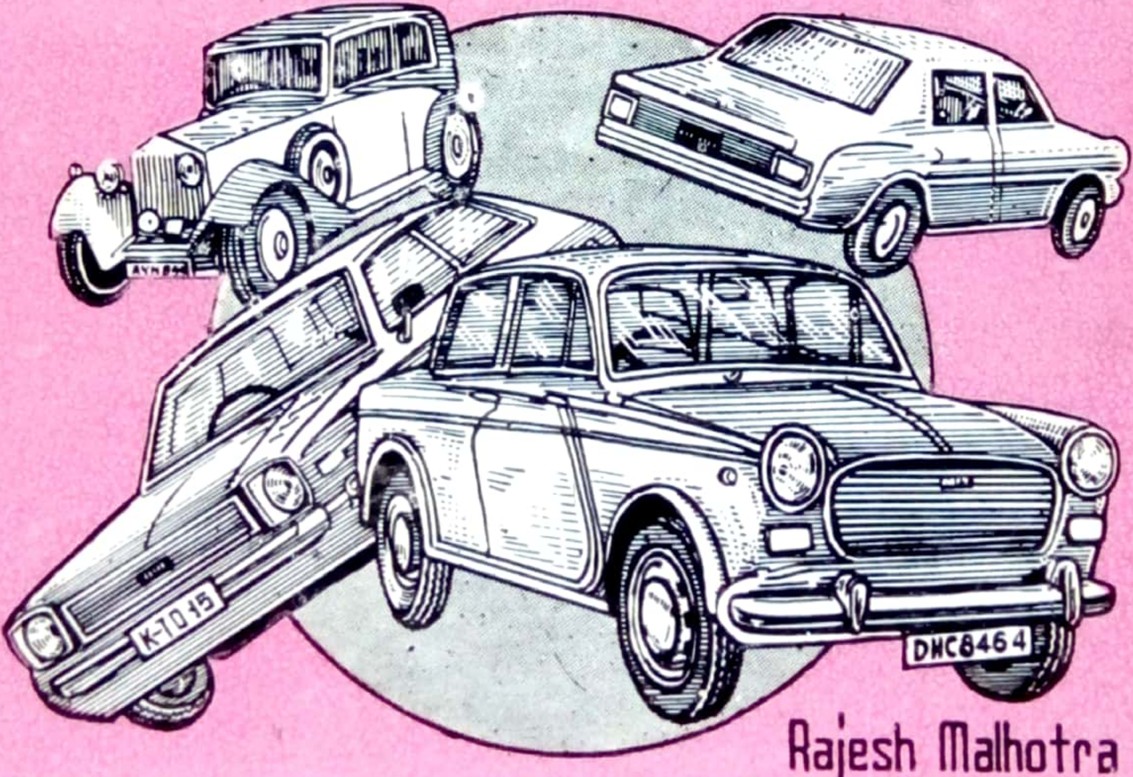
Electronic Projects for the Car



Rajesh Malhotra

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ELECTRONIC CAR PROJECTS

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Automatic Parked Indicator

Whenever you park your car on the road side at night you are supposed to switch on your parking lights. If the car is to be parked for an hour or so, one can afford to switch on the parking lights but what if the car has to be parked for the whole night. Under this condition one would certainly like to have a gadget which automatically switches on the parking lights whenever any vehicle approaches the parked car and, then, all by itself, switches them off when the approaching vehicle leaves. This way one can save considerable amount of battery power.

The use of IC (Fig. 1) makes the project very simple and minimises the wiring as very few external components are required. The LDR (light dependent resistor) acts as a sensing device. In dark, the resistance of LDR is high (mega ohms) and as the light intensity

AUTOMATIC "PARKED" INDICATOR

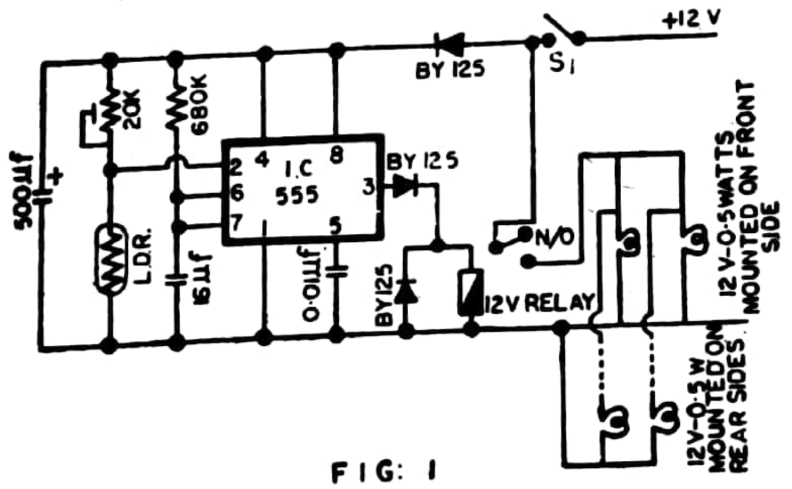


FIG: 1

increases its reststance falls to a few kilo—ohms. Thus, the LDR delivers a negative-going pulse to the 555 timer pin 2 whenever any vehicle approaches the parked car since the approching vehicle will have its head-light on. As soon as the negative going pulse is applied, the relay energises, switching on the parking lights. Then after a time interval of about 12 seconds the relay automatically de-energises, switching off the parking lights. This process repeats whenever any vehicle approaches the parked car.

Proper mounting of the sensing element, the LDR, is very important. It is advisable to place the LDR in a small box with front side open and the inside painted black. The open side of the box, placed in any convenient place in the car, should face the road so that the LDR can pickup the light of the approaching vehicle. The 20K preset is provided for initial setting of the LDR. For this, keep a lighted match stick in front of the LDR and adjust the preset such that the relay just energises. This setting makes the unit ready for operation.

Parts Required :

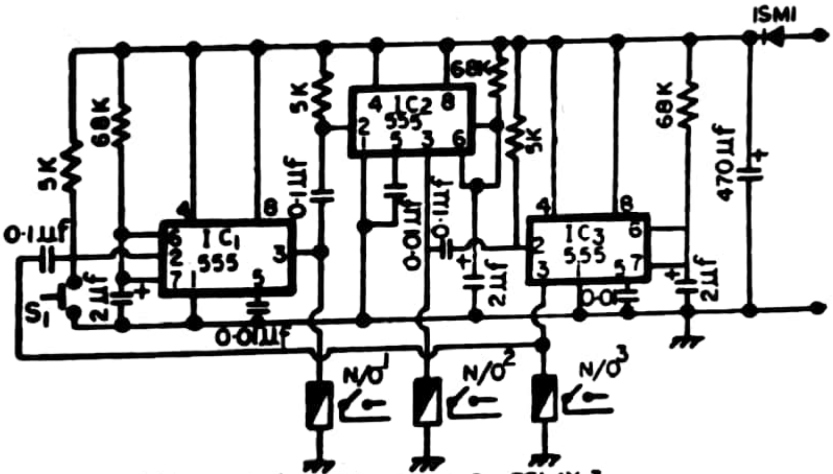
1. IC timer 555. (8 pin type)
2. LDR
4. Resistors : 680 K ;
   preset or potentiometer 20 K linear
3. Condensers : electrolytic 500 µf × 25 Volts, 16 µf 25V.
   polyster type 0.01 µf × 50 V.
5. Diodes : BY125×3
6. Relay : 12 Volts with internal resistance of 200 ohms or more.

Travelling Indicator

You must have seen certain make of cars having travelling indicators for left and right turns. Here, the arrangement of indicating bulbs, along with the electronic circuit, is in such a way that the light literally seems to travel towards the direction of turn (Left or Right). Figure 2 (b) shows Right and Left turn indicating arrows, in which the bulbs are fixed. When the right turn indicator is given, the bulbs light up in such a sequence that it looks as if the whole arrow is moving towards the right. Same is the case with the left turn indicating arrow.

The circuit diagram shown in figure 2 (a) gives the detailed plan of Travelling Light Indicator unit. Three IC timers 555 are used for the selection of sequence. Each IC is used in monostable multivibrator mode with the output of one connected to the input of the other. On switching the supply, the output of all the three ICs is low hence none of the relay energises. On pressing switch S_1, a negative going pulse is applied to pin 2 of IC_1. This makes the output of IC_1 (pin 3) high, energising relay No. 1. The output stays high for the time set by RC constant set by the 2 MFD capacitor and 68 K resistor. After the lapse of preset time, the output of IC_1 goes low and Relay No. 1 de-energises. As the output of IC_1 falls from high to low, a negative going pulse is generated, which is fed into pin 3 (tigger) of IC_2 through a condenser. Thus the output of IC_2, which was previously low, goes high and Relay No. 2 gets energised. Again after the preset time, output of IC_2 goes low, de-energising Relay No. 2 and the IC_3 gets triggered. As IC_3 gets triggered Relay No. 3 energises. Also the output of IC_3 is connected to the input of IC_1, through a condenser and so when Relay No. 3 de-energises a negative going pulse is automatically fed to the input of IC_1, which in turn energises Relay No. 1. Hence when once S_1 is pressed the Relays 1, 2 and 3 start energising and de-energising in the sequence explained above. Since the output of one IC on going low triggers the next (and so on), therefore no two relays can energise at the same time Also the sequence of operation of relays is maintained i.e. relay 1; then relay 2; then relay 3; and then again relay 1;......and so on.

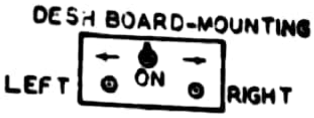
TRAVELLING INDICATOR



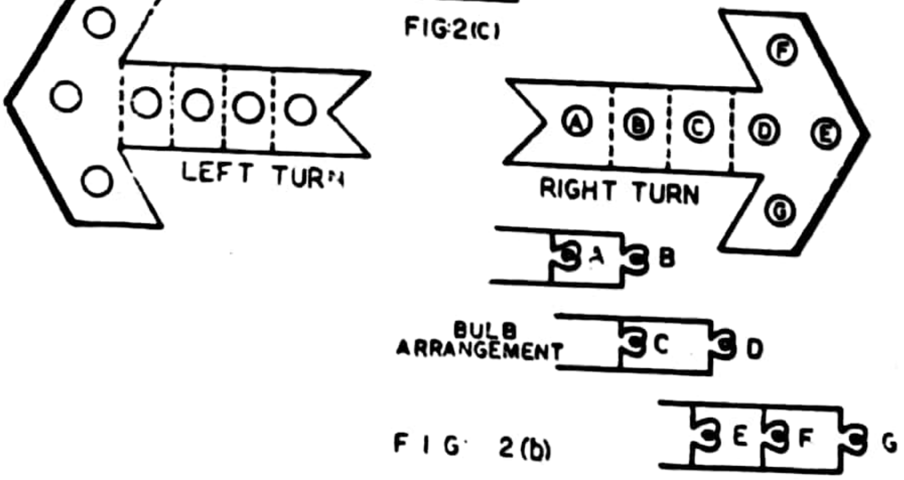
F I G: 2(a) RELAY I RELAY 2 .RELAY 3

The bulbs are connected to the relays as shown in figure 2 (b) Thus when relay 1 operates bulbs A and B light up; when relay 2 operates bulbs C and D light up and when relay 3 operates bulbs E, F, G light up. This sequence of bulb lighting takes place at such a fast rate (and is continuous and never ending) that it seems as if the light is travelling from left towards right (for right turn) and from right towards left (for left turn)

Two seperate units are used ; one for left turn signal indicator and the other for right turn signal indicator. The ON/OFF button and the switches S_1 (and S_2 for other unit) are mounted on the dash board for easy operation. Refer figure 2(C). The switch for left turn is marked left and for right turn is marked right.



FIG·2(C)



FIG· 2(b)

Caution : The circuit in figure 2 (a) is for negative ground vehicles. For positive ground vehicles inter-change the earth connections. Relay contact points are independent of polarity.

Correction : In IC2, number the connection shown above 6 as 7.

Parts Required

For Each Unit

1. IC555 Timer + 3 NoS.
2. Condensers : electrolytic : 2 mfd; 16 Volts; 3 Nos.
   470 mfd 25 Volts 1 No.
   polyster type: 0.1 mfd 50 Volts 3 Nos.
   0.01 mfd 50 Volts 3 Nos.
3. Diodes : 1SM1 1 No.
4. Resistances : (½ watt type) 5 K × 3; 68K × 3;
5. Relay : 12 Volts, internal resistance of atteast 300ohms; at least one change over contact rated for 4 Amperes.
6. Bulbs : 12 Volt 10 watts
7. Push on type switch.

Cheapest Burglar Alarm

As the name indicates, figure 3 shows the cheapest, yet very effective, circuit of a burglar alarm. The only major component required is an SCR (silicon controlled rectifier) and can very easily be connected to the existing horn system of the car.

A silicon controlled rectifier is basically a four layer n-p-p-n or n-p-n-p device with three electrodes : cathode, anode, and gate. The gate is the triggering source of the SCR. Whenever a positive potential, with respect to cathode is applied to the gate, SCR comes into conduction. Now, at this stage, even if the triggering voltage is removed from the gate, SCR stays conductive. In other words, after the SCR is triggered by the gate, the current through it is independent of the gate voltage or current. The SCR stays ON till the load current (anode-cathode) is reduced to a value known as holding current (Ih). When AC is fed across the SCR, the gate has a control because after each half cycle (positive) the SCR current fall to zero and hence needs re-triggering before it conducts in the next positive cycle.

CHEAPEST BURGLAR ALARM

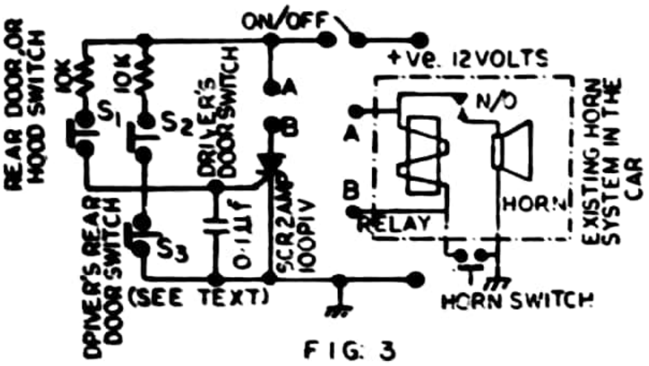


FIG: 3

The burglar alarm, figure 3, is connected to the battery (observing the right polarity and ground connection). Before leaving the car the ON/OFF switch should be closed. The switches S_1, S_2 and S_3 are push type normally open switches fixed in the car-doors. When any of the two switches S_1 or S_2 gets closed, (i.e. on opening the door) a positive potential is applied to the gate which triggers the SCR and horn starts blowing. Since the gate has no effect on the triggered SCR, so even on closing the door the unit cannot be shut off. The switch S_3, fixed on the rear door, is the alarm setting switch. When S_3 is closed the gate of SCR gets grounded and hence switches S_1 and S_2 have no effect on the alarm.

When the owner has to leave the car he should first switch on the ON/OFF switch. He should then, open the rear door (S_3 closed) and then open his door to get down. After getting down he should first close his door and then the back door. In this way he will avoid the triggering of the SCR. Now if any one opens up the front door to get in, the SCR will trigger starting the horn. ON/OFF switch should be fixed in a position so that it is not easy for any outsider to locate it.

Parts Required

1. **SCR** 100 PIV 2 Amperes
2. **Resistances :** (½ Watt) 10K × 2 NOS.
3. **Condenser :** polyster 0.1 mfd 50 V.
4. **ON/OFF Switch** : Push buttons normally closed type.

Avoid Over Heating

Figure 4 shows a solid state device which gives a visual indication whenever the temperature of thermistor exceeds the preset value. It may be used in cars to prevent over-heating of engine, rediator etc. The device has been designed in such a way so that the temperature at two different places can be checked simultaneously.

The temperature sensing device is the thermistor, (TH_1 and TH_2 in fig. 4) which is used as a potential divider along with the preset. Both the thermistors have negative temperature co-efficient i.e. with the increase in temperature their resistance decreases. Since the potential developed across the two thermistors is fed sepearately, to the base of PNP transistor (BC 170), they are able to indicate temperature at two different points. When the device is used in the car, one thermistor may be placed on the engine, to give the engine temperature and the other in the radiator to check the rediator temperature. Now, whenever any of the temperature (i.e. of radiator or engine) rises beyond the preset value, the corresponding bulb lights up giving a visual indication of over heating. (the thermistors may be placed at any other desired place).

Temperature Setting

Switch on the supply to the device and set the presets to minimum resistance range. Immerse any one of the thermistor, say TH_1, in hot water. Wait for a minute so that the thermistor attains a thermal equilibrium. Now adjust its preset (while thermistor is still in hot water bath) so that lamp 1 just lights up. Similarly set the second thermistor, TH_2, to any desired temperature. The device is then ready for use. Whenever the temperature of any of the two thermistors rises beyond the preset temperature, the corresponding lamp lights up. For correct indications, care has to be taken that the thermistor is in close contact with the point under observation.

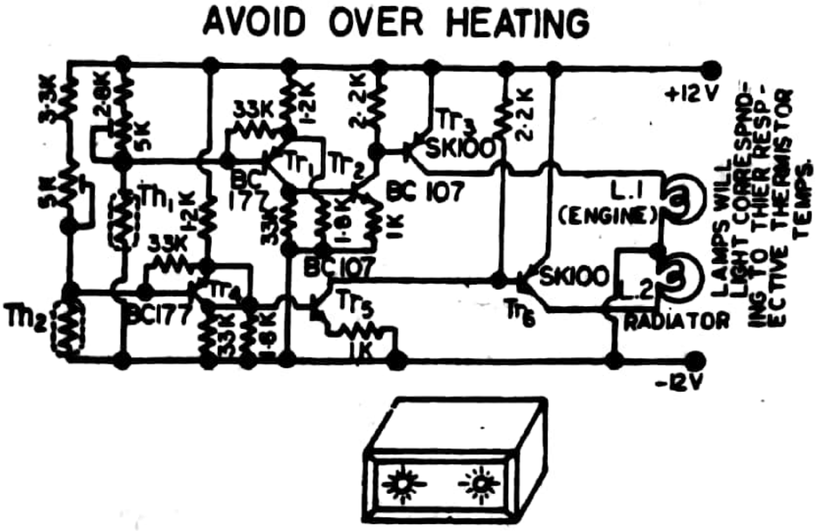


FIG: 4

Parts Required

1. Transistors : BC 177 PNP 2 Nos.
   BC 107 NPN 2 Nos.
   SK 100 PNP 2 Nos.
2. Thermistor : $TH_1 = 12$ K at 30°C.
   $TH_2 = 18$ K at 30°C.
   With negative temperative coefficient,
3. Resistances : (all ½ watt type) 3.3 K ; 2.8 K ; 33 K×4 ;
   1.2 K×2 ; 1.8 K×2 ; 1 K×2 ; 2.2 K×2.
4. Preset (linear carbon) 5K×2 Nos,
5. Lamps : 12 volts, 6—10 watts (for indication).

Police Horn

Wouldn't you like to have a device in your car, which when switched on clears the way, even in a crowded street, for you? "Police horn" is ideal for this purpose.

This installation of police alarm is very simple since it does not require any sort of manipulation with the existing car horn system and the wiring. The use of IC minimises the number of external components used and thus can be wired on a small general purpose printed board. The ON/OFF switch can be mounted at any convenient place so that the unit can be easily operated when required.

POLICE — HORN

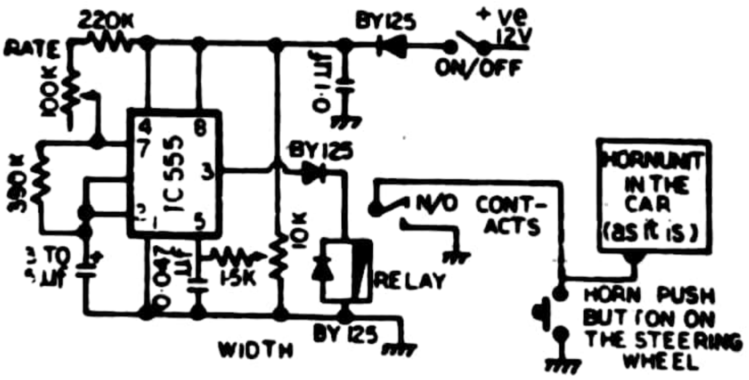


FIG: 5

IC timer has been used in free running or astable multivibrator mode. The rate and the width of the output signal which drives the relay can be set to any desired level to suit one's personal taste. The power for the unit can directly be taken from the battery. The circuit shown in figure 5 is suited for cars having negative ground In case of positive ground cars, simply reverse the power connections, i.e. connect +12 volts terminal to ground and the grounded points of unit to the negative terminal of the battery.

Since there is going to be "make and break" action at the relay contacts, it results in slight sparking. Due to this the relay points may get spoiled with the passage of time. If this happens, simply clean the relay points with the help of sand-paper. This can, however, be avoided if the relay having contact rating of about 10 Amps. is used.

Correction : In the IC in Fig. 5, number the connection shown above 2 as 6.

Parts Required

1. **IC 555 timer**
2. **Diods ; BY 125×3 Nos.**
3. **Condensers : electrolytic ; 3 to 5-mfd 12 volts**
   polyster type : 0.047 mfd ; 0.1 mfd.
4. **Resistances : (all ½ watt type) 390 K ; 220 K ; 1.5 K.**
5. **Potentiometer : 100 K ; 10 K ; Linear.**
6. **Relay : 12 volts with internal resistance of at least 200 ohms. Contact points rated for at least 5 Amps.**

Door Left Open Alarm

At times absent mindedly, one just drives off without checking whether the person has got into (or got down) the car or else one may, by mistake, drive off with one of the doors open. In either case the result could be fatal. This cheap and easy to assemble device gives an audible warning as soon as any of the four doors is left open while the ignition is on.

The circuit is nothing but an oscillator. The positive supply to the oscillator is taken from the ignition switch. Under off conditions (ignition off) the supply to the unit is cut and as soon as the ignition is switched on the unit gets connected to the positive supply. Normally open type switches are fixed on all the doors and wired to the unit as shown in figure 6. When even one of the doors is left open

DOOR-LEFT-OPEN ALARM

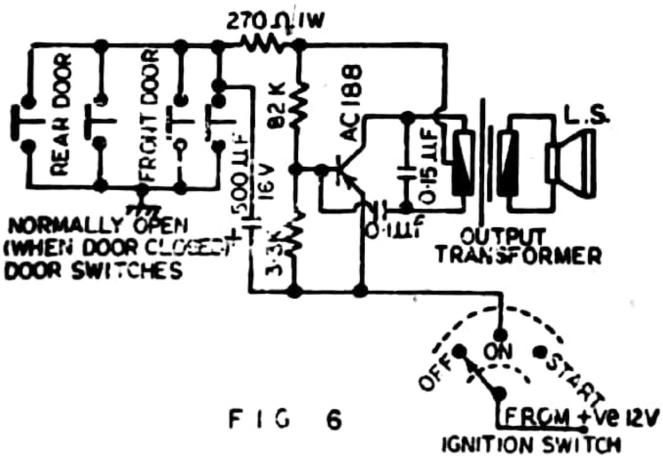


FIG 6

(while the ignition is on) the unit gets grounded and the oscillator comes into action, warning the driver. No seperate ON/OFF switch has been provided to the unit since under normal conditions i.e. doors properly closed and ignition on, no current is drawn from the battery. When the ignition is off, opening or closing of doors has no effect on the unit. However, with slight modifications one can use it as a burglars alarm.

In case of +ve ground vehicles (where +ve of battery is grounded) just connect the earth points of the unit to the battery negative terminal (through ignition switch) and earth the positive point, which in Fig 6 is connected to ON point of the ignition switch,

Parts Required

1. Transistor : AC 188.
2. Condensers : electrolytic : 500μf × 16 V.
   polyster type : 0.1μf 50 V.
   0.15μf 50 V.
3. Resistances : 270 ohms 1 watt.
   82 K ¼ watt.
   3.3 K ¼ watt.
4. Transformer : Output transformer matching with the transistor AC 188.
5. Speaker : Matching with the output transformer.

Distress Signals

What if you get stuck somewhere on the high way or in the city at night ! At that hour, you wouldn't like to stand on the centre of the road and signal the passersby for help. So why not have a device which can do this type of a job for you? The device 'distress signal'. can also be used for any other signalling purpose.

The device essentially consists of two transistors (BC107) astable multivibrator. Astable or free running multivibrator generates voltage pulses occuring at regular intervals, without the need of any external synchronising pulse. It is basically a two stage RC coupled amplifier in which the output of second stage is fed back to the imput of the first stage. At any instant only one transistor conducts while the other is biased beyond cut-off. When both the base resistors and both the capacitors are of the same value, a square wave output is obtained. The output of the second transistor [Fig. 7(a)] is fed to the

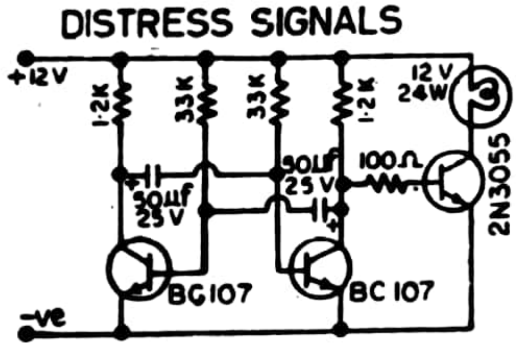


FIG: 7(a)

base of power transistor. The lamp, in series with the power transistor, thus starts flashing. The power transistor should be mounted on a heat sink.

To give the device a professional touch, mount the bulb in a red plastic or glass case with a suitable reflector. (See fig. 7b) The bulb with the cover may then be fixed on to the roof of the car.

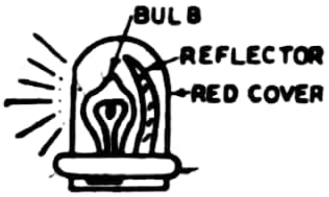


FIG 7(b)

The device can be fitted, without any modification, for both the positive ground and negative ground vehicles. However care has to be taken that the power transistor is electrically isolated from the heat sink.

Parts Required

1. Transistors :-	BC107 × 2 Nos. 2N3055 with heat sink.

2. Condenser :- electrolytic 50µf × 25 volts 2 Nos.

3. Resistences :- (½ watt type).
   1.2k × 2.
   33k × 2
   100 ohms × 1
4. Bulb 12 volts 24 watt or of lower wattage.
5. ON/OFF Switch; reflector; plastic or glass cover.

Wiper Pause

During light drizzles one does not require a continuous wiping action. It also proves irritating and many a time leaves scratches on the wind screen since there is not enough of water to keep the wipers well lubricated. The best solution under this condition is to have a device which can turn the wiper ON/OFF periodically and automatically, without diverting the attention of the driver.

The wiper motor is connected through the wiper pause unit (see fig. 8) The whole unit may be placed at any suitable place in the car while the two ganged controls, a potentiometer with switch, should be mounted some where close to the driver so that it is easy for him to control the unit.

WIPER PAUSE

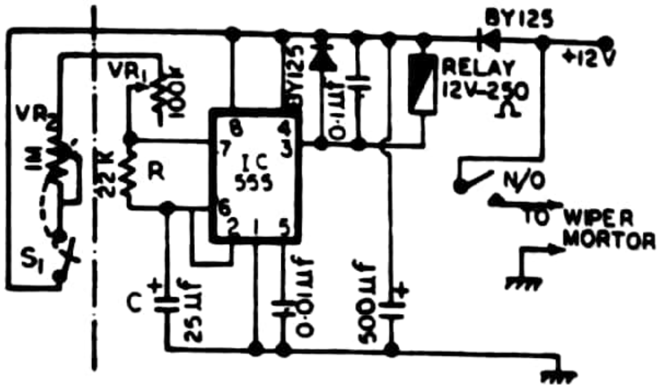


FIG: 8

The unit 'wiper pause' is an astable multivibrator. When the switch S_1 is closed, C starts charging through VR_1, VR_2 and R (see figure 8). Till the time the condenser is not charged to 2/3 Vcc, the output at pin No. 3 stays high and hence the relay stays de-energised, As soon as condenser charges to 2/3 Vcc (across pin 6), the internal comparator causes pin 7 to go low and C_2 starts discharging through R. This in turn actuates the relay, switching on the wiper motor. Since the discharge time is smaller than the charge time, [discharge time=RC; charge time =(VR_1+VR_2+R) C.] the relay stays de-energised for a longer period of time. By adjusting VR_2 the charge time of the condenser 'C' can be varied and hence the wiper pause can be varied accordingly. VR_1 is used for initial setting and should generally be set at maximum resistance range.

The wiper motor is connected through the N/O points of the relay, as shown in figure 8. This circuit is suitable for negative ground vehicles. When desired to use in positive ground vehicles, small changes are required. Firstly, interchange the units' polarity connections i.e. ground the line marked +12 volts and connect the point shown as grounded in fig. 8 to the negative terminal of the battery. The wiper motor connections are independent of the polarity and stay as they were.

Parts Required

1. IC 555 timer
2. Condensers : electrolytic 25 mfd × 16 volts.
   500 μfd. × 25 v.
   polyster 0.01 μf } 50 volts.
   0.1 μf
3. Resistances : 22k
   Potentiometer 1 Meg. with switch
   Preset 100k.
4. Diodes :- BY 125 × 2 Nos.
5. Relay : 12 volts with internal resistence of 200 ohms or more and having at least 5 Ampere contact rating.

Car Cigarette Lighter

In the age of luxury, wouldn't you like to possess an automatic car cigarette lighter. This automatic lighter switches on, when required, and heats the heating coil and then automatically switches off after the preset time of about 30-40 seconds. This time however can be varied.

The heating coil is made up of a small length (having the resistance of 15 to 20 ohms) of the heater coil, which is freely available in all electrical stores. This heating coil is fixed in a heat proof (clay, glass or heat resistant plastic) conical cup type body. (See fig. 9 b) The extension cord is insulated wire capable of carrying at least 5 Amps of current. The length of the wire should be about 2 mtrs, so that it is easy to light up the cigarette even for the person sitting away from the unit,

CAR CIGARETTE LIGHTER

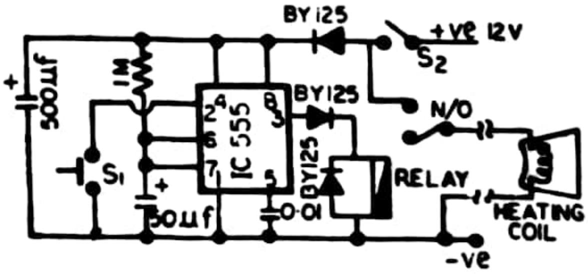


FIG. 9(a)

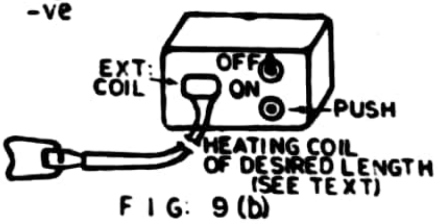


FIG. 9(b)

The 555 timer IC has been used to provide the time delay It is used in a monostable multivibrator mode. On closing S_2 (refer fig. 9(a). supply gets connected across the unit. Till the time S_1 is not pressed the relay stays de-energised and hence the heating coil stays cold. As soon as S_1 is pressed, a negative going pulse is applied to pin No. 2 (trigger) of the IC and relay energises, allowing the current to flow through the heating coil. Now even if S_1 is released the relay stays energised. After the interval, determined by RC, the relay de-energisees automatically and stays de-energised till S_1 is pressed again. Thus on pressing S1, momentarily, current flows through the heating coil and after the preset time the current is automatically cut off. The time period can be reduced by decreasing either C or R (or both)

Parts Required

1. IC. 555
2. Condensers : electrolytic : 50µf × 16 volts.

500µf × 25 volts
polyster type : 0.01µf × 50 v.

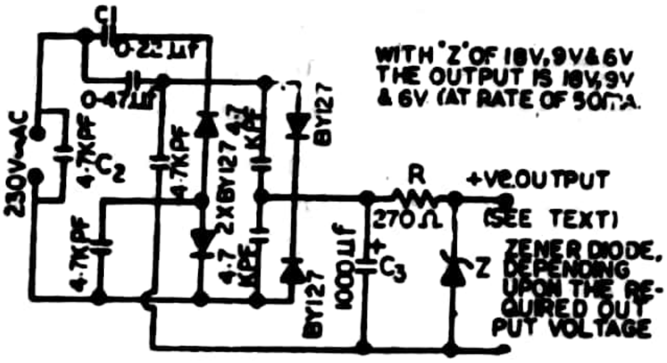
3. Diodes . BY125 × 3.
4. Relay :- 12 volts; with internal resistance of 200 ohms or more with one change over cantact rated for at least 5 Amps.
5. Heating coil elements; extension cord etc.

Transformer-less Eliminator

Figure 10 shows a simple, light duty, transformerless battery eliminator-cum-charger. Apart from being simple it has other unique features like over load proof; short circuit proof; negligible heating effect; and above all, can tolerate output short conditions for infinite period of time.

The circuit has been designed to deliver an output voltage of 18, 9 or 6 volts at a rate of 50 mA, which is sufficient for driving pocket transistor or for charging purpose. The capacitor C_2 is added to prevent mains wiring interference. The output current is controlled by the capacitor C_1 placed in series with the bridge rectifier. In circuit diagram (fig 10) C_1 comprises a parallel combination of two capacitors, 0.22 µf and 0.47 µf. In order to increases the current, C_1 may be raised whereas to decrease the current C_1 may be lowered. A four diode bridge rectifier follows the capacitor C_1. Each rectifier diode (refer fig 10) is shunted by a capacitor (4.7 kpf) to eliminate

TRANSFORMER LESS ELIMINATOR



WITH 'Z' OF 18V, 9V & 6V THE OUTPUT IS 18V, 9V & 6V (AT RATE OF 50mA.

ZENER DIODE, DEPENDING UPON THE REQUIRED OUTPUT VOLTAGE

FIG: 10

any interference caused by rapid switching action of the diodes. C_3, an electrolytic capacitor, is a smoothing capacitor. The resistance R is a current limiting rasistance and zener Z keeps the output voltage constant. The output voltage depends upon the zener voltage and hence any required output voltage can be obtained.

Under no load conditions (i.e. output open) the full current flows through the zener diode. Under short circuit condition full current (50 mA) flows through the short circuit. Thus in either case the current through the resistor R is limited to the full current rating (50 mA)

Caution :

Since there is no isolation between the mains and the output, it is advised not to touch any part of the unit while the supply is on.

Parts Required

(1) Diodes BY 127×4
(2) Zener diode—as per the requirement.
(3) Capacitors : electrolytic : 1000μf×25 volts.
polyster type : 0.22 μf; 0.47 μf 600 VDC
4.7kpf× 5
(4) Resistance : 270 Ohms 1 watt.

Head Light Dimmer

Headlights have a blinding effect on the driver of the incoming car. Since it becomes difficult for the driver of the approaching car to see anything clearly, it might lead to an accident. It is also not possible to drive with the headlights off, especially in areas where the street lighting is poor. So the only possible alternative is to drive with dim headlights. To achieve this purpose "Head light dimmer" is used.

The circuit of Head light dimmer is shown in figure 11. It is capable of reducing the current through the head light lamps and hence lowering their intensity. Transistors T_1 T_2 form an astable multivibrator which generates a square wave with a variable mark space ratio. This variation in the mark space ratio is produced by the preset and the potentiometer (see figure 11). The astable multivibrator, in turn, drives the monostable multivibrator (T_4 T_5) which gives pulses to the amplifier, consisting of power transistors 2N3055. Since the current drawn by the head lights is high, it is necessary to mount the power transisters in a proper, heat sink. The collector of the power transistor is connected to the body and so electrical insulation of the transistor and the heat sink is necessary.

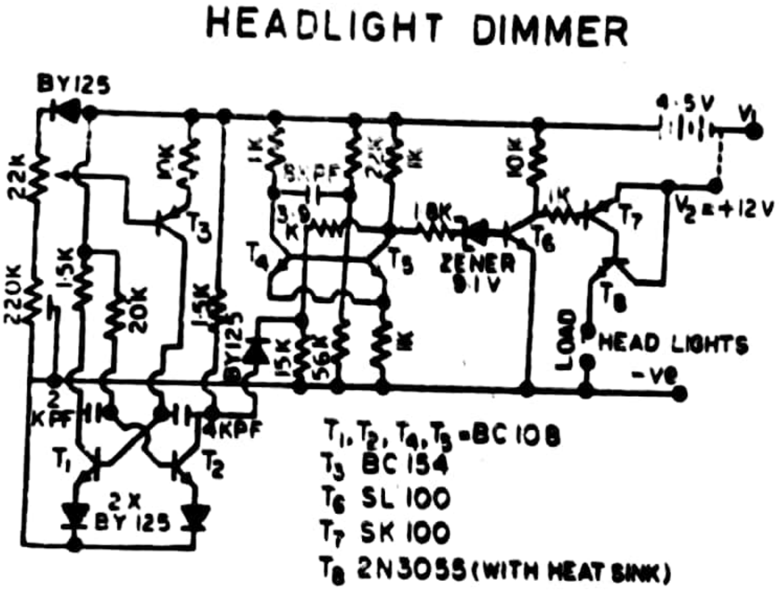


FIG: 11

The voltage applied (V_1) to the unit should be greater than the voltage (V_2) applied to the head lamps, If we assume V_2 to be car battery voltage (i.e. 12 volts) then we have to connect three cells in series before connecting V_1 to the car battery. In this way V_1 becomes (12+4·5) 16.5 volts. In any case V_2 should not be greater than V_1.

This unit can also be used indoors to control the current through any resistive load upto the capacity of 10 Amps.

Pasts Required :

1. Transistors :—	BC 108 × 4 Nos
	BC 154 × 1 „
	SL 100 × 1 „
	SK 100 × 1 „
	2N3055 × 1 with heat sink.

2. Diodes :— BY125×3
   Zener diode 9.1 volt 300 mw.
3. Condensers :— polyster 2 kpf;
   8 kpf;
   4 kpf;
4. Resistances (all ½ watt)
   1.5k×2; 20k; 10k×2: 15k;
   1k×4: 56k; 22k: 39k; 1.8k,
5. Potentiometer 22k linear.
   Preset 220k.

Prevent Car Lifting

Figure 12 shows the circuit diagram of a burglar alarm. The unique feeture of this alarm is that it provides sufficient time to the owner to set the alarm and leave the car without sounding off the alarm. In other words, alarm comes into action after a few seconds of setting.

The circuit employes a dual timer IC 556(14 pins). When the hidden switch S_1 (refer fig. 12) is closed C_1 discharges and the output at pin 5 goes high (about 12 volts). Till the time the output at pin 5 is high the relay stays de-energised. So for setting the burglar unit, switch S_1 is opened so that C_1 commences to charge and the output at pin 5 goes low. If the car doors are shut or closed within 1.1 C_1 R_1 second (approx 15 sec.) the relay stays de-energised and the alarm does not sound. Switches S_2, S_3 are push button type switches, fixed in the car door in such a way that when the door is closed the switches open. Now, after setting the unit, if any of the car door (having the door switch S_2 or S_3) is opened, the short cirtuit across the capacitor C_2 gets removed and it starts getting charged through R_2. If the door is left open for the time interval determined by C_2 R_2 (about 6 seconds), the output of pin 9 goes low and the transistor comes into conduction, energising the relay. Now at this stage, had S_1 been open, the output of pin 5 would have been high and hence the relay would not have energised. When the relay gets energised, its contact shorts the collector of the transister to its emitter and the relay latches. Now even if the car door is closed the relay stays energised and the horn keeps blowing. It can only be switched off by closing S_1, which makes the output at pin 5 go high, de-energising the relay.

Thus, when the owner returns to the car he opens a door and C_2 commences to charge. However, if he closes S_1 within the time R_2C_2 (6 seconds) of opening the door, alarm will not sound.

PREVENT CAR LIFTING

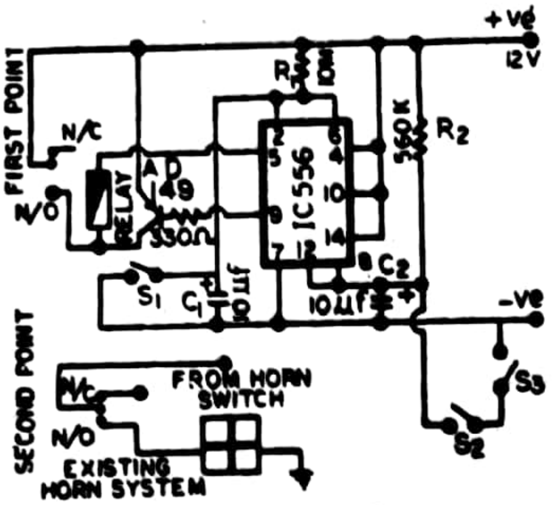


FIG: 12

The switches S_2 S_3 are connected in series so that on opening any of these, the short circuit across C_2 is released. One may add more such switches in series and place them at all the doors and /or in the hood.

Parts Required

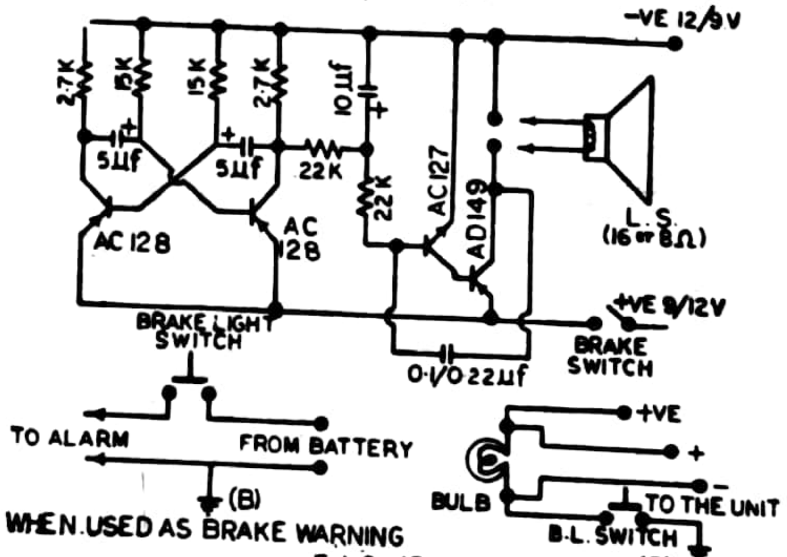
(1) Dual timer IC 556
(2) Transistor :— AD 149
(3) Condensers :— electrolytic 10 µf × 16 volts. 2 Nos.
(4) Resistances :— (all ¼ watt type)
10 Meg ; 560k ; 330 Ohms.
(5) Relay 12 volts, two change over contacts ;
Contact Rating 5 Amperes.

Whelper Alarm

Whelper alarm, unlike other ordinary alarms of constant pitch, has a continuously varying pitch. This sort of an alarm is much more effective and atteniton-catching than the ordinary ones.

The speaker can be ordinary paper cone type or small metallic horn type. The supply to the unit is through the brake light switch (observing the correct polarities). Brake light switch is a hydraulic switch, (normally open type) fixed on to the brake fluid pressure line.

WHELPER ALARM



F I G: 13

Whenever the brake is applied, the fluid pressure closes the switch, completing the circuit. Thus, on application of the brake, the whelper alarm starts giving notes of varying pitch.

In certain cases the brake light switch has one point grounded [fig. 13(c)] while the other is connected to the brake light bulb. In such a case, connect one point of the whelper alarm to the brake light bulb terminal (observing the correct polarity) and the other terminal to the battery. However, if one intends placing the complete unit in the dickey of the car, with the speaker fixed near the exhaust pipe bracket, the power supply connections for the unit, in that case, may be taken from across the brake light bulb as shown in fig 13 (c)

Parts Required

(1) **Transistor :—** AC 128×2
AC 127×1
AD 149×1

(2) **Condensers ;—** electrolytic 5 μf, 12 volt. 2 nos.
10 μf, 2 volts.
polyster type : 0.1 μf or 0.22 μf.

(3) **Resistances :—** (all ¼ watt)
15k×2 ;
2.7k×2
22k×2

(4) **Speaekr :—** paper cone type or metallic horn type ; 8 × impedance.

Delayed Roof Light

As soon as one opens front seat door, the roof light lights up and on closing the door it goes off. Device "Delayed roof light" introduces a time delay of about 15-20 seconds after the door is closed. After the lapse of the time delay the roof light automatically switches off. This 15-20 seconds time delay, during which the light stays on, is sufficient for the driver to take out the keys, select the right key and insert the key into the ignition switch.

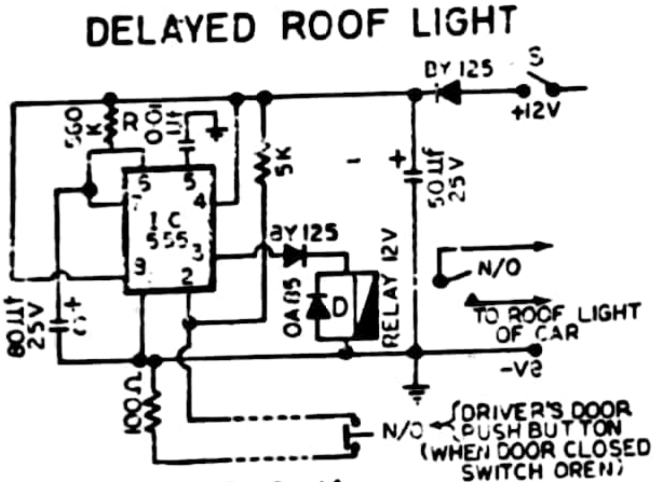


FIG 14

Here, refer figure 14, IC 555 timer has been used in mono-stable. multivibrator mode. Mono-stable multivibrator has one stable and other quasi-stable state. Under no input pulse condition it stays in the steady state for infinite period of time. As soon as an input pulse is applied, its state changes. Since the new state attained is quasi-stable, it reverts back into the stable stage after the lapse of time determined by the constant RC. It then stays in the stable state until another input pulse is applied. In circuit 14, whenever the driver's door is opened a negative going pulse is applied to the trigger (pin 2) of the IC and the output (pin 3) goes low and the relay gets actuated. At the same time, condenser C starts getting charged through resistance R. The voltage across the capacitor rises exponentially with the time. As soon as the voltage across the capacitor equals $\frac{2}{3}$V the threshold camparator (pin 6) resets the flip-flop and the output goes low and the relay gets de-energised At the same time the capacitor starts discharging. The relay, now stays deenergised unless the door is opened again.

Relay is an inductive load and the collapsing magnetic field of the relay (on getting de-energised) generates back emf. The back emf or the transient voltage can damage the IC. So in order to prevent the IC. from any damage due to transient voltage effect, a diode D is connected parallel to the relay, in the reverse biased position.

On changing the values of R or C, the time constant can be varied. With the values of R & C as in figure 14, a time delay of about 30 seconds is obtained.

Parts Required

1. IC 555.
2. Condensers : eletrolytic : 80µf × 25 v.
   50µf × 25 v
   polyster 0.01µf × 50 v.
3. Resistances : (½ watt type) 560k ; 5k ; 100 ohms.
4. Diodes : By 125 × 2 Nos.
   0A 85
5. Relay : 12 volts with internal resistance atleast 200. ohm;
   Single pole single throw type.

Tube Light In Car

This small inexpensive gadget enables one to light up an ordinary 220 volts flourescent tube on merely a 12 volts car battery. Though the tube light will not be quite bright but still it will lighten up the place.

This device is suitable for both positive and negative ground cars. since the input is free of any polarity marks. Because of the four diode bridge configuration at the input, correct polarity is automatically attained. If one wants to dispense with these four diodes one will have to be careful while making the battery connections. The emitter of AD 149, [fig. 15(a)] in that case, should be connected to the positive terminal and the centre-tap of the transformer to the negative terminal of the battery. Wrong polarities, in this case, can burn out the power transistor and/or the transformer. It is, therefore, recommended to use the four diodes and prevent any such accidental damage.

TUBELIGHT IN CAR

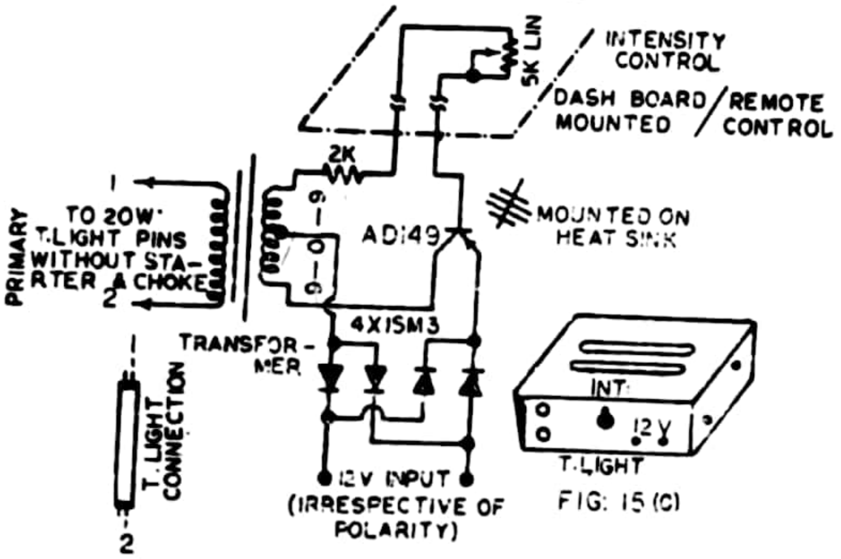


FIG:15(b) FIG:15(a) FIG:15(c)

The transformer is an ordinary step down transformer with secondary rated for 9-0-9 volts at 1 ampere. This transformer is used in step-up mode to deliver high voltage at the primary. To the primary, a 20 watt tube light (without choke and starter) is connected [see fig. 15(b)]. The 5K potentiometer controls the intensity.

Caution

Do not touch the primary while the unit is in operation, since high voltage is indueed in it.

Parts Required

1. Transistor : AD 149 with suitable heat sink
2. Resistances : 2k $\frac{1}{2}$ watt.
   potentiometer 5k linear.
3. Transformer : Step down.
   primary—240-250 volts
   Secondary—9-0-9 volts
4. Diods : 1SM3 × 4 Nos.

Car Amplifier

The circuit in figure 16 is a four watt mono car amplifier. It proves very useful for music lovers who would like to enjoy loud and clear music in the car, by connecting just an ordinary cassette player or radio to the amplifier. It can also be a source of entertainment for small gatherings such as in picnics etc.

The circuit (fig. 16) shows a direct coupled, four tansistor, class B amplifier. The transistor BC 148 is the input stage; second,

CAR AMPLIFIER

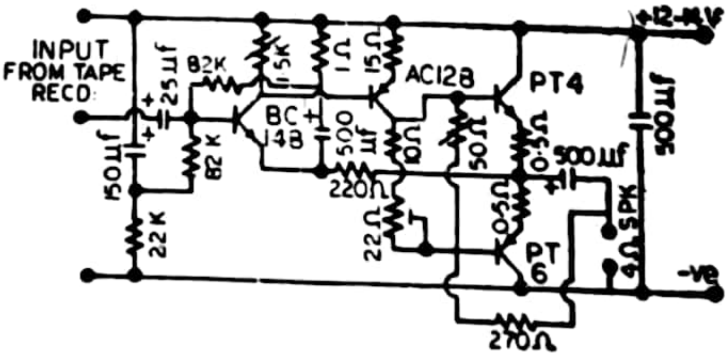


FIG. 16

the germanium transistor AC 128 is the driver while the output transistors PT 4 and PT 6 form a complementary output pair. It is suggested to mount the power transistors on suitable heat sinks

Each power transistor should be electrically isolated from the heat sink because its collector is shorted to its body. No control (like volume, tone etc.) is provided in the circuit so as to minimize the cost of the amplifier, The volume, tone etc. can be set to a desired level by the controls in the cassette player or radio itself,

Two 8 ohms speakers, connected in parallel, can be used with the amplifier. If more than two speakers are to be used, ensure that the total impedance in any case does not fall below 4 ohms. In case the speaker impedance falls below 4 ohms, overloading of the amplifier will take place which might result in burning out the power transistors.

Parts Required

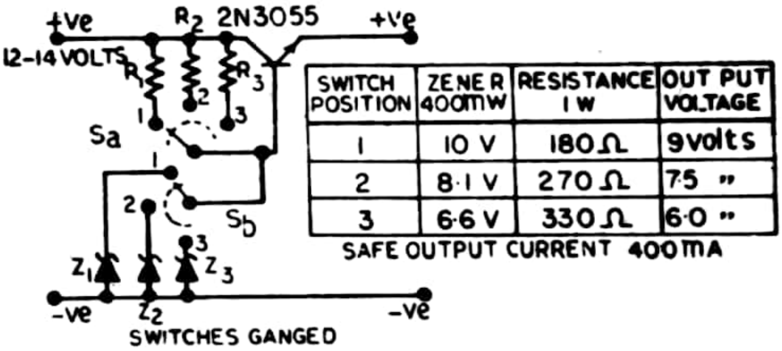
1. Transistors BC 148
    AC 128
    PT 4; PT 6 matched pair.
2. Condensers ; electrolytic :—
    500 μf 25 volts 2 Nos
    150 μf—19 volts
    25 μf × 16 v.
    500 μf 16 v.
3. Resistances :—all ¼ watt type.
    2.2k; 82k × 2; 0·5 ohms × 2; 220 ohms; 10 ohms;
    15 ohms, 270 ohms
    1 ohm 1 watt w.w.
    Preset : 22 ohm
4. Thermistors --t°c. 50 ohms and 1.5 k ohms
5. Speaker :—8 ohms speakers 6 watts × 2 Nos.

Car Battery Adapter

Many a time one feels like playing cassette recorder, transistor etc. on the car battery. Since tape recorder draws considerable power, they very soon exhaust the small cells. "Car Battery Adapter", enables one to play cassette recorders of 9 volts ; 7.5 volts and 6 volt (i.e. 6 cell type ; 5 cell type and 4 cell type respectively) on the car battery. The gadget is so small in size that it can very easily fit into the cassette recorder itself.

The switch Sa, Sa (ganged) can be eliminated if one requires just a particular output voltage. For example, say output of 6 volts is required. From the table shown in figure 17, the resistance R and the zener diode Z is selected and connected as per the circuit diagram. Since the suggested safe output current is 400 mA, no heat sink is required for output power transistor. Thus we are left with only a transistor, resistor and zener which can very easily be fitted inside the cassette recorder or the transistor.

CAR BATTERY ADAPTOR



SWITCH POSITION	ZENER 400mW	RESISTANCE 1 W	OUT PUT VOLTAGE
1	10 V	180 Ω	9 volts
2	8·1 V	270 Ω	7·5 "
3	6·6 V	330 Ω	6·0 "

SAFE OUTPUT CURRENT 400mA

FIG: 17

For getting variable output voltage the switch has to be used.

Parts Required

1. Transistor : 2N3055
2. Zener diodes : (all 400 mw)
   10 V ; 8.1 V and 6.6 Volts.
3. Resistances : (1 watt type)
   180 ohm ; 270 ohm ; 330 ohm.

Short-Proof 12V-6V Conversion

This is probably the safest 12 V—6 V conversion (DC to DC) circuit. The input of the circuit is protected against wrong polarity connections and the output is regulated and short-proof.

At the input, four diodes are connected in bridge configuration which are responsible for the automatic polarity property. Suppose point A (refer figure 18) is connected to the positive supply and B to the negative the diodes D_1 and D_4, in this case, get forward biased while D_2 and D_3 are reverse biased. Thus point C attains a positive potential with respect to point D. Now, if A is connected to the negative supply of the battery and the point B to the positive diodes D_1 and D_4 get reverse biased while D_2 and D_3 get forward biased. This again results in C attaining a positive potential with respect to D.

SHORT PROOF 12V-6V CONVERSION

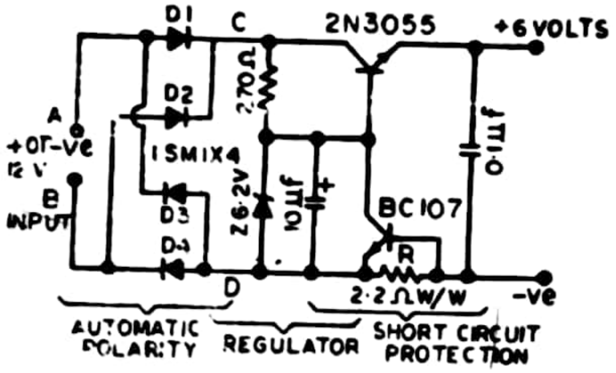


FIG: 18

Transistor, BC 107, and the resistance R form a short-circuit protection. As soon as the current through the resistor R rises beyond the safe limits (about 270 mA), BC 107 triggers into conduction making the output zero. Whenever the emitter base voltage (i.e. across resistor R) exceeds 0.6 volt the transistor triggers into conduction. By ohms law ($R = \frac{V}{I}$), whenever current through the resistance R, 2.2 ohm increases beyond 270 mA, a voltage of about 0·6 volt is developed across it. This brings the transistor into conduction grounding the base of 2N3055. Thus, the output current is limited during over loading or short circuit conditions.

Parts required

1. Transistors : 2N3055.
   BC 107.

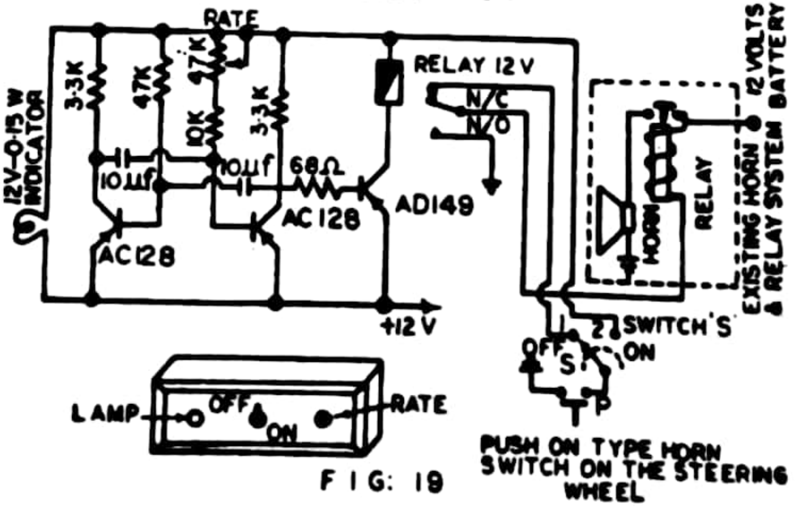
3. Diodes : 1SM1 × 4 Nos.
3. Zener diode : 6.2 Volts 400 mw.
4. Resistances : 270 ohms ½ watt,
    2·2 ohms 5 watt.
5. Condensers : electrolytic : 10μf 12 Volts
    polyster type : 0.1μf 60 Volts.

Pe-Pe Effect

An interrupted sound is much more ear-catching than a continuous tone. It is seen that, generally, interrupted horn hooting is much more effective than the ordinary horn hooting. The device "Pe-Pe effect" has been designed to get interrupted horn hooting effect from the present horn system in the cars.

The existing horn system is indicated by the dotted line block (in figure 19). The relay is normally open type. When the horn push button P (mounted on the steering wheel) is pressed, the relay energises and the horn gets connected to the 12 volts supply. Into this existing system "Pe-pe effect" is connected, as shown in figure 19, through a switch S. When switch is in position 1, the device is out of the circuit and the horn works as it would otherwise do. When switch is in position 2, the device gets connected to the circuit Now, when P is pressed (while S is in position 2) an interrupted

PE-PE EFFECT



F I G: 19

horn hooting is obtained. The rate of hooting i.e. the number of interruptions can be adjusted by the 47K potentiometer. A small lamp placed parallel to the device acts as an indicator lamp.

Note

The device shown in figure 19 is designed for negative ground vehicles. However for positive ground vehicles, connect positive terminal of the device to ground and the negative points (shown as earthed in figure 19) to negative terminal of the battery.

Parts Required

1. Transistors : AC 128 PNP 2Nos.
   AD 149 PNP
2. Condensers : electrolytic : 10μf , 16 volts 2Nos.
3. Resistors (½ watt type) 3.3K × 2 ; 47K ; 10K ; 68 ohms
4. Potentiometer : 47 K linear.
5. Relay : 12 volts ; Single pole double throw type (SPDT)
   with at least 10 Amps change-over contacts.
6. Switch : One pole two way rated at 5 Amps
7. Indicator lamp : 12 volts. 1 watt.

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